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In two cases the cells stained with toluidin blue, thionin, or cresyl violet, completely lost the stain in the differentiating alcohol. The tissue in one case had been fixed in Hatai fluid, in the other in 10 per cent formalin followed by Hatai. These cells stained with hematoxylin showed in one case, that fixed in Hatai, some apparently normal cells, but others with destruction of the tigroid and eccentric nuclei. In the other case the cells were uniformly shrunken and deeply staining.

In but two cases was there any manifest change in the white matter of the cord. In one, Marchi's method showed degeneration in the direct and crossed pyramidal tracts with a small amount of subpial degeneration in the dorsal columns, more in the upper dorsal than in the lower. In this case there was a round cell infiltration of the pia-arachnoid and surrounding the vessels, with some thickening of the walls, not of a syphilitic nature. In the other case, Weigert Pal stain showed well-marked degeneration in the posterior columns of the cervical, dorsal, lumbar, and upper sacral regions.

In two cases there was considerable hyperemia. In the others the vessels and meninges were apparently normal.

These changes agree with what has previously been found in pellagra. The only change in the central nervous system found frequently enough to be considered at all characteristic is a more or less marked degeneration of the tigroid substance of the anterior horn cells and of the large cells of the cortex.

#### TRANSFUSION OF BLOOD IN PELLAGRA.

L. J. POLLOCK AND ARTHUR H. CURTIS.

The form of pellagra among the patients of the Cook County Institutions was severe, the disease running its course essentially uninfluenced by the most approved therapeutic measures. Despite the utmost diligence in the treatment and nursing of these patients, the death-rate during the years 1909 and 1910 was 67 per cent and 57 per cent. The favorable report of Cole and Winthrop<sup>1</sup> therefore aroused especial interest in the possible value of trans-

<sup>1</sup> *Jour. Am. M. Ass.*, 1910, 54, p. 1354.

fusion for cases with grave prognosis. These writers report transfusion of 11 pellagrins, from the results of which they concluded that "transfusion is of undoubted value in certain severe and apparently hopeless cases." In their opinion blood obtained from a cured pellagrin possesses no advantages over that from a normal individual. They have since reported nine additional cases, making a total of 20, with eight deaths, 12 recoveries, and one relapse.

In view of Cole and Winthrop's encouraging report, which was quite in contrast with results from other forms of treatment, we decided to perform transfusion in a series of selected patients with decidedly grave outlook. In all except one instance our transfusions were performed by means of the Crile canula. One transfusion was performed according to the method described by Curtis and David.<sup>1</sup> Our series consists of 12 cases which may be divided into three groups, (1) moribund and dying; (2) very sick, practically hopeless cases; (3) those with active and severe pellagra. Six patients were of the first, four of the second, and two of the third groups. Patient 1 of group 1 was transfused with the blood of a cured pellagrin. All other donors were normal individuals. A total of 16 transfusions were performed, four pellagrins being twice transfused.

## SYNOPSIS OF CASES.

Name	Group	Condition	Duration of Disease	Result
M.M. ....	1	Comatose	4 months	Death in 30 hours
S.R. ....	3	Fair	2 months	Recovery
M.O'C. ....	3	Poor	2 months	Recovery
N.S. ....	2	Rapidly failing	2½ weeks	Recovery
J.K. ....	2	Very weak, failing	2 months, 10 days	Recovery
L.G. ....	2	Critical	1½ months	Death in 15 days
A.L. ....	1	Comatose	2 months	Death in 6 hours
D.W. ....	1	Stuporous, dying	2 weeks	Death in 7 days
T.O.H. ....	1	Stuporous, dying	1 month	Death in 3 days
R.S. ....	1	Death impending	2 weeks	Death in 15 days
L.S. ....	1	Moribund	Unknown	Death in 12 hours
T.F. ....	2	Very weak, failing	1 month	Recovery

1. M.N. Admitted June 8, 1909. Diagnosis, constitutional inferiority. Female, age 35.

1/25/10. Developed diarrhea, pain in abdomen, incessant crying, depression, stomatitis.

3/25/10. Patient's symptoms increasing, diarrhea worse; rapidly failing.

<sup>1</sup> *Jour. Am. M. Ass.*, 1911, 57, p. 1453.

- 4/25/10. Skin now shows slight roughness. Patient has become completely comatose, heart action very weak, pulse thready, slow respiration; death impending.
- 4/26/10. Transfused with blood of cured pellagrin
- 4/27/10. Died at 9:00 P.M.
2. M.O'C. Admitted October 21, 1909. Diagnosis, dementia praecox. Female, age 22.
- 5/15/10. Dermatitis of lower eyelids. Has diarrhea.
- 6/15/10. Lesions spreading; loss of weight.
- 7/11/10. Rapidly losing weight, has become very noisy, much weaker; quality of skin poor, muscles soft and flabby.
- 7/13/10. In a critical condition.
- 7/14/10. Transfused.
- 8/ 1/10. Fully recovered.
3. N.S. Admitted April 28, 1910. Diagnosis, dementia praecox. Female, age 24.
- 8/28/10. Developed pellagra with marked symmetrical dermatitis over wrists, hands, forehead, and face. Tongue red, marked diarrhea, rapidly losing weight, suffering from a severe intoxication.
- 9/ 8/10. Transfused.
- 9/30/10. Gaining rapidly in weight, skin lesions disappearing. Bowels normal.
4. L.G. Admitted February 27, 1908. Diagnosis, dementia praecox. Female, age 35.
- 2/27/08. Suffering with chronic pulmonary tuberculosis.
- 6/19/10. Has developed symmetrical dermatitis of both hands and forehead, losing weight; has diarrhea.
- 8/13/10. Acute exacerbation of above condition with marked weakness and unsteady gait. Condition critical.
- 8/20/10. Transfused; thrombus locally before desired amount transfused.
- 8/26/10. Transfused, successfully.
- 9/11/10. After a noted improvement patient has developed a new erythema over forehead and one mastoid. Dysentery marked. Patient is entering into a stupor and is developing bed sores.
- 9/30/10. Died.
5. S.R. Diagnosis, dementia praecox. Female, age 37.
- 5/ 1/10. Developed erythema over backs of both hands, giving way to desquamation. Beginning dysentery. Patient rapidly losing weight.
- 7/ 8/10. Transfused; thrombus formation locally during transfusion.
- 9/23/10. Transfused successfully, followed by marked improvement.
- 10/ 1/10. Recovered.
6. R.S. Admitted May 7, 1908. Diagnosis, mania-depressive. Female, age 50.
- 9/ 3/10. Has lost considerable weight. Shows marked weakness. Pigmentation over hands, roughening and fissuring of knuckles; is semi-stuporous. Death impending.
- 9/20/10. Transfused.
- 9/24/10. Tongue, red, beefy, marked stomatitis. No diarrhea. Patient stuporous.
- 10/ 5/10. Failed rapidly and died.

7. T.O.H. Diagnosis, cerebral syphilis. Male, age 34.
  - 9/ 1/10. Patient has been failing physically for the past month. Has developed erythema over forehead, stomatitis, intermittent dysentery; failing rapidly.
  - 9/17/10. Transfused. Thrombosis.
  - 9/23/10. Patient weaker. Diarrhea increased. Extremities spastic, semi-comatose.
  - 10/ 1/10. Transfused. Successful operation.
  - 10/ 4/10. Rapidly failed and died.
8. A.L. Admitted August 15, 1907. Female, age 27.
  - 6/ 1/10. Temperature 103° F. Marked leukocytosis. Temperature running septic curve. Probably acute endocarditis.
  - 6/15/10. Recovered.
  - 7/ 7/10. Continues losing strength. Apathetic, stuporous, grayish pigmentation of both hands.
  - 8/ 7/10. Bright scarlet eruption over face. Tongue red. Dysentery. Patient failing.
  - 8/25/10. Condition critical. Respirations 12 per minute. Pulse felt with difficulty. Deep coma. Transfused 11:00 A.M.
  - 8/25/10. Died, 6:00 P.M.
9. J.K. Admitted June 18, 1908. Diagnosis, dementia praecox. Female, age 48.
  - 8/ 8/10. Has lost weight. Developed period of excitement. Has symmetrical dermatitis of hands. Lips dry and cracked. Tongue red. Dysentery.
  - 8/18/10. Transfused.
  - 8/21/10. Patient rapidly improving. No diarrhea.
  - 10/ 1/10. Recovered.
10. D.W. Admitted June 23, 1910. Diagnosis, dementia praecox. Male.
  - 6/23/10. Pulmonary tuberculosis.
  - 8/20/10. Has developed erythema over back of hands. Tongue red. Salivation, marked stomatitis. Commencing to fail rapidly. Symptoms more marked. Diarrhea increasing. Stuporous; has rapid pulse. Death imminent.
  - 9/ 3/10. Transfused.
  - 9/ 8/10. After temporary improvement redeveloped stupor.
  - 9/10/10. Died.
11. L.S. Admitted October 14, 1910. No history obtainable. Patient admitted in state of collapse, semi-stuporous. Marked weakness. Vaginal mucous membrane and mucous membranes of mouth and conjunctiva very red. Has marked enteritis with discharge of fetid greenish stools. Tongue red, papillae prominent. Desquamation of skin over dorsal surface of both hands. Redness and fissures over knuckles. All deep reflexes lost.
  - 10/16/10. Transfused. Patient's pulse stronger. Aroused from stupor.
  - 10/17/10. Died at 2:00 A.M.
12. T.F. Admitted October 13, 1910. Diagnosis, dementia praecox, pulmonary tuberculosis.

- 9/25/10. Beginning to lose weight. Weakness, marked diarrhea, skin lesions developed over the dorsum of hands, skin atrophic and red. Over the nose and face are similar lesions. Tongue and mucous membrane red.
- 10/19/10. Unsuccessful transfusion.
- 10/22/10. Successful transfusion.
- 11/ 7/10. Skin lesions have disappeared, patient has gained 20 pounds in weight.

A résumé of the results obtained reveals the following: Death eventually resulted in spite of transfusion in all six patients of group 1, in one of group 2, and in none of group 3. The mortality in these selected severe cases consequently did not fall much below the mortality from pellagra in general. The transfusion performed on those patients who were moribund was unavailing in our hands. The most that can be claimed is that the heart action was strengthened, the color and appearance of the skin improved, and the patient temporarily aroused from stupor, only soon to revert into the condition which existed prior to transfusion, with death the ultimate outcome. Of the four patients representing group 2, one showed temporary improvement followed later by recurrence of severe symptoms and death. Three made marked improvement with final recovery from the existing attack of pellagra. The patients of group 3 improved immediately after transfusion with resultant rapid disappearance of all signs of the disease.

#### CONCLUSIONS.

In our experience transfusion in pellagra is of value chiefly because it increases the general resistance of the patient. Transfused blood has a life of three weeks, at the end of which time the corpuscles undergo the natural laws of senescence. No special selective stimulating action was observed to result from the introduction of normal blood into the circulation of pellagrins. Such beneficial results as were undoubtedly obtained we would expect to result from the transfusion of patients afflicted with other wasting diseases. With the development of a simplified technic in the performance of which but little time is required and the amount of blood can be measured, we would recommend repeated transfusions in severe cases of pellagra. Under such conditions it may prove of value in the treatment of this dreaded disease.